

U.S.S.N. 10/044,538
Filed: January 10, 2002
AMENDMENT AND RESPONSE TO OFFICE ACTION

In the Claims

1. (previously presented) A polycation composition comprising:
 - a) a polysaccharide chain having an amount of saccharide ranging from 2 to 2000 saccharide units;
 - b) at least one oligoamine grafted covalently to said polysaccharide chain per each segment of 5 saccharide units, wherein said oligoamine is a linear, branched or cyclic alkyl amine having at least two amino groups; and
 - c) at least one further grafted group which is either a hydrophobic group or an amphiphilic group grafted covalently to said polysaccharide chain per each segment of 50 saccharide units, wherein said hydrophobic group or amphiphilic group includes an aliphatic chain of at least 4 carbon atoms.
2. (previously presented) A biodegradable polycation complex with a polyanion comprising:
 - a) a polysaccharide chain having an amount of saccharide ranging from 2 to 2000 saccharide units;
 - b) at least one oligoamine grafted covalently to said polysaccharide chain per each segment of 5 saccharide units, wherein said oligoamine is a linear, branched or cyclic alkyl amine having at least two amino groups; and
 - c) at least one further grafted group which is either a hydrophobic group or an amphiphilic group grafted covalently to said polysaccharide chain per each segment of 50 saccharide units, wherein said hydrophobic or amphiphilic group includes an aliphatic chain of at least 4 carbon atoms; and

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wherein the hydrophobic or amphiphilic group is complexed with an anionic macromolecule selected from the group consisting of polynucleic acids, proteins and polysaccharides that are anionic.

3. (original) A biodegradable polycation composition according to claim 2, wherein said anionic macromolecule is selected from the group consisting of a plasmid, an open chain polynucleic acid, an oligonucleotide, an antisense, a peptide, a protein, a polysaccharide and combinations thereof.

4. (original) A biodegradable polycation composition according to claim 1, wherein said polysaccharide chain is selected from the group consisting of dextrans, arabinogalactan, pullulan, cellulose, cellobios, inulin, chitosan, alginates and hyaluronic acid.

5. (previously presented) A biodegradable polycation composition according to claim 1, wherein said saccharide units are connected by a bond selected from the group consisting of acetal, hemiacetal, ketal, orthoester, amide, ester, carbonate and carbamate bonds.

6. (original) A biodegradable polycation composition according to claim 1, wherein said polysaccharide is a synthetic polysaccharide formed from the condensation of an aldaric acid and a diaminoalkane.

7. (original) A biodegradable polycation composition according to claim 1, wherein said grafted oligoamine is grafted to said polysaccharide chain by a bond selected from the group consisting of an amine bond, an imine bond, an amide bond and a carbamate bond.

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8. (currently amended) A biodegradable polycation composition according to claim 1, wherein said oligoamine has the formula:

NH₂-[CH₂)_x-N-(CH₂)_y-N(R')(CH₂)_z-]n-NH₂ NH₂-[CH₂)_x-N-(R)-(CH₂)_y-N(R')-
(CH₂)_z-NH₂

wherein x, y, z are an integer between 0 and 4 and x+y+z+ x+y+z is between 1 and 4 and n is at least 1 when x+y+z=2 or more, or at least 2 when x+y+z=1 and wherein R and R' groups are H or an aliphatic group of 1 to 6 carbons.

9. (original) A biodegradable polycation composition according to claim 1, wherein said oligoamine is a peptide of up to 20 amino acids with at least 50% of the amino acid are cationic including lysine, ornithine, and arginine.

10. (currently amended) A biodegradable polycation composition according to claim 1, wherein said oligoamine is a selected from the group consisting of spermine and modified spermine.

11. (previously presented) A biodegradable polycation composition according to claim 1, wherein said oligoamine is a linear or branched ethyleneimine oligomer having up to 10 ethylene imine units.

12. (previously presented) A biodegradable polycation composition according to claim 1, having an amphiphilic residue wherein said amphiphilic residue is selected from the group consisting of fatty chains, phospholipids, cholesterol, ethylene glycol oligomers, propylene glycol oligomers and combinations thereof.

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13. (original) A biodegradable polycation composition according to claim 12, wherein said ethylene and propylene glycol oligomers have a fatty chain block on one side.

14. (previously presented) A biodegradable polycation composition according to claim 12, wherein said amphiphilic residue is connected to said polysaccharide chain by a bond selected from the group consisting of an amine, amide, imine, ester, ether, urea, carbamate and carbonate bonds.

15. (original) A biodegradable polycation composition according to claim 12, wherein said amphiphilic residue is an oleic chain.

16. (original) A biodegradable polycation composition according to claim 12, wherein said amphiphilic residue facilitates the crossing of the polycation through biological membranes.

17. (original) A biodegradable polycation composition according to claim 1, wherein said polycation composition is not toxic or immunogenic.

18. (previously presented) A biodegradable polycation composition according to claim 1, wherein said composition further comprises a ligand for facilitating the binding of said composition to a cell or tissue.

19. (currently amended) A biodegradable composition according to claims claim 1 or 2, in combination with cationic and nonionic lipids or polymers for enhanced cell transfection.

20. (currently amended) A biodegradable composition according to claims

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claim 1 and or 2, wherein polycation has a structure selected from the group consisting of a comb-like chain, a branched chain and a cross-linked chain.

21. (original) A pharmaceutical composition, comprising the composition of claim 2, in combination with a pharmaceutically acceptable carrier.

22. (original) A pharmaceutical composition of claim 21, in combination with a biodegradable polymer matrix or capsule for controlled, timed and extended delivery of the complex.

23. (currently amended) A porous matrix suitable as a scaffold for cell growth comprising a polycation composition comprising

a) a polysaccharide chain having an amount of saccharide ranging from 2 to 2000 saccharide units;

b) at least one oligoamine grafted covalently to said polysaccharide chain per each segment of 5 saccharide units, wherein said oligoamine is a linear, branched or cyclic alkyl amine having at least two amino groups; and

c) at least one further grafted group which is either a hydrophobic group or an amphiphilic group grafted covalently to said polysaccharide chain per each segment of 50 saccharide units, wherein said hydrophobic group or amphiphilic group includes an aliphatic chain of at least 4 carbon atoms.

24. (currently amended) A cationic coating composition used useful in the printing or electronic industry industries comprising the polyeation composition according to claim 1 comprising

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- a) a polysaccharide chain having an amount of saccharide ranging from 2 to 2000 saccharide units;
- b) at least one oligoamine grafted covalently to said polysaccharide chain per each segment of 5 saccharide units, wherein said oligoamine is a linear, branched or cyclic alkyl amine having at least two amino groups; and
- c) at least one further grafted group which is either a hydrophobic group or an amphiphilic group grafted covalently to said polysaccharide chain per each segment of 50 saccharide units, wherein said hydrophobic group or amphiphilic group includes an aliphatic chain of at least 4 carbon atoms.